Replacing Loose Motor Mounts

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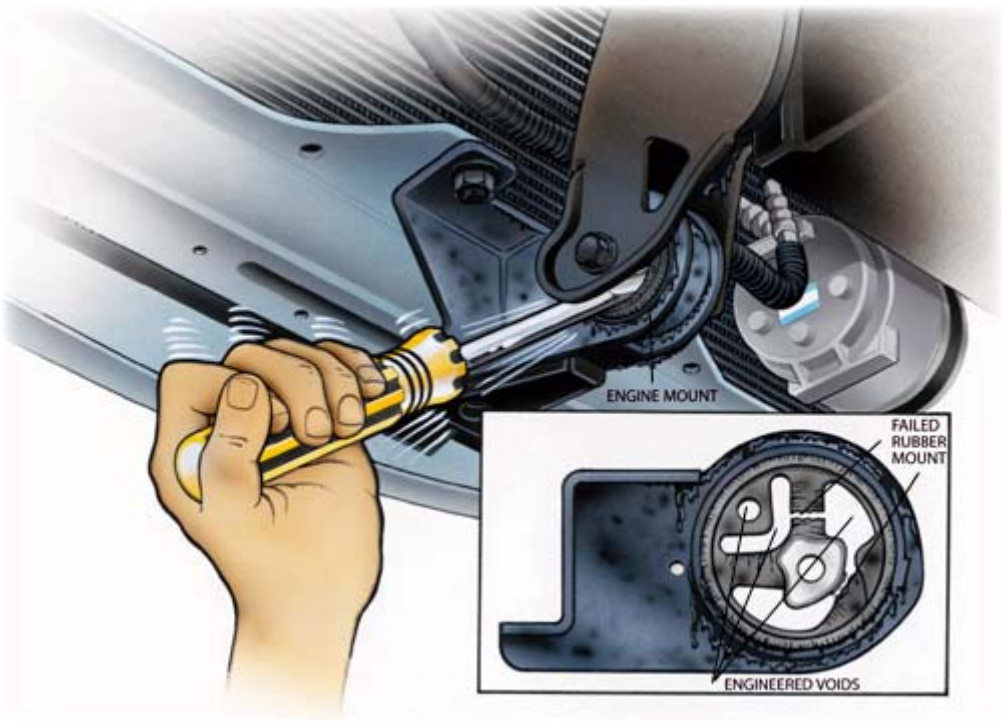

Failed engine mounts can let your engine rotate far beyond acceptable limits when you accelerate or decelerate smartly.

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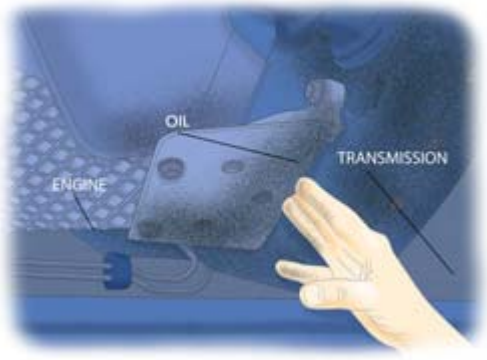
Friday night. It's yet another traffic light in front of the strip mall. And the pimple-faced hat-backward driving the lowered rice rocket next to you is revving his throttle menacingly, eyes bright with the

possibilities of conquest. Fortunately, you know your V8 musclecar can handle his blender-motor skateboard. Green. Throttle. *Squaaawwwk* followed by a *ding, ding, buzz, gurgle, hiss*. You've just sawed a hole in your radiator hose with your fan--your engine mounts have failed.

The mountings that hold the engine in place are way down in the dark places of your engine bay, and nobody pays much attention to them. That is, until those steel and rubber sandwiches start coming apart, typically because an oil leak has softened the rubber. This allows the engine to lift off its support, rotating under its own torque, and it doesn't take much of a change of position to cause interference. In the days of rigid throttle linkage, this sometimes resulted in the dangerous scenario of your putting the pedal to the metal and having it jam there, wide-open.

Many older mounts relied on the rubber-to-steel bond exclusively, so when the mount failed the engine could rotate a long distance (drag racers used to run a chain from the head to the chassis to preclude this). Newer designs usually have interlocking steel fingers that limit movement even if the rubber is gone.

An indication of failure on rwd vehicles, or those with fwd and a longitudinally mounted engine, is a continuous scraping noise caused by the fan contacting the bottom of its plastic shroud. This is the result of deteriorated rubber--the mounts collapse under the weight of the powerplant, allowing the engine to settle into a lower-than-normal position. We've seen people simply cut away the lower section of the shroud to eliminate the interference, but what does that do to the critical airflow pattern? And how far are the blades from the radiator now that the operating angle has changed? That kind of contact is expensive.



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A primary cause of failed engine mounts is oil contamination from a bad crankshaft seal, or a leaky valve-cover gasket.

Some late models employ hydraulics to go beyond the simple idea of using rubber's compressibility to reduce vibrations. As in a chassis shock absorber, fluid is forced through an orifice between two chambers at the top and bottom of the mount as they are compressed and expanded by engine shake. These fail from a loss of fluid, and typically cause a more sudden and more pronounced clunking than you'd get from a gradually dissolving rubber mount.

Shot Or Not?

Unfortunately, you can't just look at a motor mount and tell if it's coming apart. Although if you can get close enough and have a bright light, you might see cracks or rips in the rubber (of course, any mount that's soaked with oil from a leaky valve or cam cover should be considered suspect). With an inline Four or Six, you may be able to push against the top of the engine with enough force to lift the weight off the mount and observe how far it moves. But with V6s and V8s, you'll definitely have to enlist the power of a jack or a pry bar to raise the engine on the side where it tends to rise under acceleration (crankshafts may rotate clockwise or counterclockwise, so that could be either side or, with front-wheel drive and a transverse engine, the front or rear).

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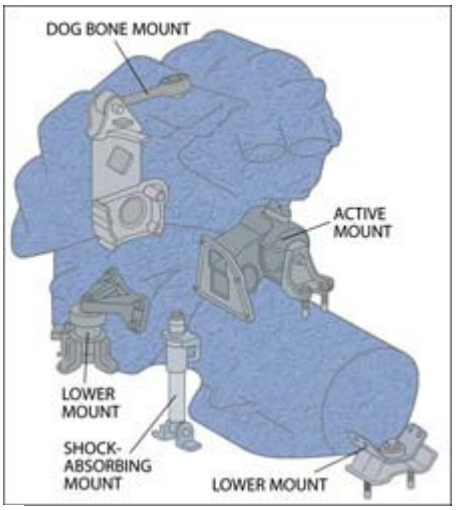
This upper mount is easy to check and rarely fails. Note voids to allow a small amount of nearly unrestrained movement.

Find somebody to help and you can do this diagnosis without getting under the car. First, park the car where it won't smash into something. Block the wheels. Open the hood, stand at the side of the fender and peer down with your light. Then, have your assistant set the parking brake, hold his left foot firmly on the brake pedal, start the car, put it in Drive, and step carefully on the gas ("torque it up," as they say) until you can see if there is any rotational movement present. Do the same in Reverse to compare. Listen for any unhealthy noises too.

Down And Dirty

On lower mounts, replacement can range from very easy to very difficult. We remember inline Sixes for which it was only necessary to push the valve cover to tilt the engine, wedge a piece of 2 x 4 between the chassis or suspension and the block, reach over the fender, then unbolt and remove the old mount. Alas, that's not often the case anymore. Today, you likely will have to put the car on sturdy jackstands or ramps, get underneath with a hydraulic bottle jack and assorted chunks of wood to take the weight off the mount (don't jack against the oil pan), then get extremely dirty removing the bolts and old mount. Here's where the one positive aspect of oil leakage comes in: If everything's being continuously bathed in liquid lube, chances are you won't have to fight with any seized threaded fasteners.



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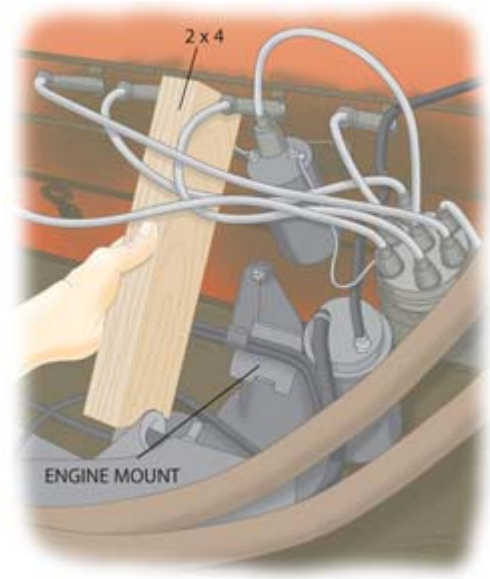
There are many types of engine mounts. Some have electrical or vacuum connections.

If you see odd-looking voids in the rubber sections of the mounts, it's not from beavers chewing on them. Many mounts have holes, with carefully calculated shapes, cast into them at manufacture. The purpose of these engineered voids is to tailor the stiffness of the rubber to the application, and allow a mount to be substantially stiffer in one plane than another. This will allow the engine to shake harmlessly in one degree of freedom, to isolate vibration, while retaining stiffness under acceleration or deceleration.

Strange and frustrating problems often are caused by flubbed installation. Be sure to mark each old mount to indicate its direction before extracting it, then match that to the new one because there's a good chance that it can be installed 90° or 180° from its proper position, or the right one on the left side and vice versa. This might place the engine too far fore or aft, perhaps causing interference. Positioning the mount incorrectly also can make it impossible to line up bolt holes, or you could experience unusual driveline conditions such as a heavy banging when you go over bumps caused by the driveshaft's slip yoke slamming into the transmission's tailshaft. Or, the mount may be designed with more rigidity on one side than the other to reduce roughness--improperly installing it will negate this benefit.



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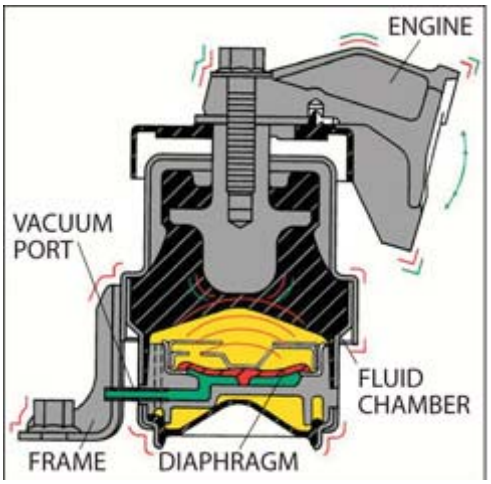
You'll need to lift and restrain the engine somehow to replace the old mount.

Needless to say, you'll need to correct the oil leak if that's the proximal cause of the failed mount. And if one mount fails, take a close look at the others, especially if they're soaked with oil. You may as well change all the suspect mounts at once.



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How It Works: Shake Busters

Honda was first to introduce a system that enlists the power of the engine management computer to reduce vibration at idle. The mounts are hydraulic with two fluid chambers. But these are connected by orifices controlled by a vacuum-operated rotary valve. When the computer sees idle speed or that the a/c has been switched on (the load of the compressor can roughen things), it commands a solenoid valve to allow engine vacuum to reach a diaphragm that, in turn, opens the rotary valve. This makes the mount softer, hence more able to absorb unwanted vibrations. If you've suddenly noticed that idle is not as smooth as it once was, the first thing to check is the vacuum line that runs down to the mount. If it's intact, pull the hose off the solenoid and find out if vacuum is present at the solenoid's nipple during idle with the a/c on. No? Then you'll have to refer to factory troubleshooting information for the engine management system.

But that's passive. A more sophisticated, active approach, such as originally used on certain Lexus models, incorporates hydraulic mounts with an internal diaphragm that pulsates at a frequency calibrated to produce a vibration counter to that of the engine at idle, thus canceling out that last little hint of roughness. Beyond checking the wiring, diagnosis of this system is strictly high-tech.

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